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ABSTRACT

Theories of the acquisition of word meaning among children are reviewed and a case study of one child is reported. Three models of how the young child associates words with underlying concepts and conventional meanings are noted. While one model proposes that children initially overextend word meanings, the other two models propose that new words may initially refer only to a single referent. A monolingual Hebrew speaking child was studied over an 8-month period extending from the emergence of her first meaningful word to the time she combined words. Notes, recordings, and videotapes of interactions were used to collect data. The use of the 337 words acquired by the subject during the study period was analyzed according to extension categories, including underextension, regular extension, overextension, and unclassifiable. Definitions and examples of each category are provided. Underextension of word meaning during the early stages of acquisition was prevalent, but overall it was observed that different words follow different routes of meaning development (RW)

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ON THE IDENTIFICATION OF THE EXTENSIONAL BEHAVIORS OF NEW WORDS[1]

Over the last decade intensive efforts have been directed at the question of how children acquire the conventional meaning of words. Today, it is assumed that the child's early semantic development is closely related to her[2] growing conceptual abilities, and that there are complex interactional processes between cognitive development and language acquisition (e.g. Bowerman, 1978a; Nelson, 1974, 1978; Schlesinger, 1977). There are several proposals as to how the young child associates words with underlying concepts. In the present talk, the models of Clark, Bowerman, and Schlesinger are briefly reviewed since these models formed the background to my own study.

In 1973 Eve Clark published an important paper in which she presented her theory of meaning acquisition - the "Semantic Feature Hypothesis". She argued that during the early phases of production children use words for which they do not yet know the full adult meaning. Initially, the meaning of a new word is incomplete in the sense of including only a subset of the semantic components or primitives that are associated with that word in adult speech. Clark hypothesized that upon hearing a word the child observes one or several most salient perceptual features of the object or event which is named by the word, and infers that these features alone are included in the meaning of the word. Since the early meanings of words lack specificity, these words are used very broadly by the child. For example: if the word doggie is taken by the child to mean (four legged animal), it is applied to all kinds of animals and not only to dogs. Subsequently through repeated experiences with the new word, the child further differentiates the contexts for using the word. The list of features included in the underlying representation of the word increases gradually, and thus, the uses of the word become more and more appropriate to the point where they correspond with those of the

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adult (i.e the word dog is applied to dogs only).

Bowerman's (1978b, 1980) model of word meaning is based on a cognitive theory of concept formation known as "prototype" theory (Anglin, 1977; Brown, 1977; Carey, in press; Rosch, 1975, 1977). This theory suggests that non-linguistic categories center around one exemplar or a prototypical member -- the "best" exemplar of that category. The "best" exemplar is surrounded by other members which are not as representative for the category as is the best exemplar, but which share some attributes with the "prototype". In this framework, then, membership in any category is not a question of all-or-none, and there is no one criterial attribute which is shared by all members.

A new word, according to Bowerman, may initially be attached by the child to the best exemplar, and only later will it be extended to other referents. These referents do not necessarily share the same attributes and therefore some words may show "complexive" behaviors (Vygotsky, 1962). Consider Bowerman's example of the verb kick (in Bowerman 1978; 274).

Initially Eva used the word kick as she kicked a floor fan with her foot. Later on she extended the word and used it while looking at pictures of Kitten with ball near its paw, while watching moth fluttering on a table, just before throwing something, as making ball roll by bumping it with front wheel of a kiddcar, and when pushing her stomach against a mirror.

In a recent book entitled Steps to Language, Schlesinger (1982) presents a third model of word meaning acquisition which he calls word-referent pairing. Schlesinger takes a more behavioral approach to learning, claiming that words are initially learnt by the child as personal names for single referents. They become label for universal sets only later on, through repeated experiences of pairing the same word with different referents. The universal set or the underlying category is formed by an operation of discriminative generalization. The word table, for example, is initially

learnt as the name of one specific table (e.g. the kitchen table), later on it is attached to other tables in the house (desks, the living room table, and so on). Finally table comes to mean tables in general no matter where or when the child encounters one.

To sum up the views presented so far, while Clark predicts that children initially overextend the meanings of words, Schlesinger and Bowerman propose that new words may initially be referring to a single referent or a few closely related referents. That is, competing models make contradictory predictions as to whether meanings develop from general-to-specific or vice versa. It thus seemed necessary to test this question empirically. To this end I decided to generate a comprehensive, and non-selective data base on the early uses of words by one subject, taking the one-word stage as the period of data collection.

The subject was Keren, my own daughter, a monolingual Hebrew-speaking child. I carefully observed her early linguistic development throughout a period of eight months: from the emergence of her first meaningful word and until she combined words over 30% of the time in one hour of audio recording. In my diary type investigation (Braunwald & Brislin 1979), I employed three sources of information.

a. Handwritten notes on the contexts in which the subject uttered every word from the time of its emergence through the end of study;
b. periodic audio recordings, representative of the child's ordinary speech and mother-child verbal interactions in specific blocks of time;
c. Four thirty-minute video-taped play sessions of the child interacting with one of her parents.

This combination of data collection procedures was adopted to compensate for the drawbacks inherent in each procedure alone. It also provided the means for conducting five different measures of reliability and validity on the data (see Dromi 1982 for details on data collection, transcription and statistical measures).

The entire lexicon of 337 words all acquired throughout the one-word stage was analysed. Figure 1 shows the total number of words in the child's lexicon at the end of each week of study.

Figure 1 about here

Data analysis was based on a preplanned operational code, devised for measuring changes over time in the extension of each word. Repeated scores were given to each word on a weekly basis by looking at all the information that had been collected for that word during the week. A word was assigned to one of four mutually exclusive classes: underextension, regular extension, overextension, and unclassified. The definition of each class and a few illustrative examples of context descriptions are given below:[3]

A. UNDEREXTENSION: The use of a word for one referent only or restricted to a subset of instances of the adult category corresponding to the same word.

(1) 12(7) - 15(7); K produces the word pil 'an elephant' only in those contexts in which her white elephant toy is present. However she fails to produce the word when she plays outside on a slide in the shape of an elephant or when I show her other elephant toys or pictures of elephants in a picture book.

(2) The first five recordings of K's word an (katan) 'small' have all been recorded in the same context (i.e. the one that is cited below).
16(8); In the living room; M and K are drawing on a piece of paper. K says myau (her sound for a cat) and M draws a little cat. K says an/x/ 'small'. M draws a smaller cat. K seems delighted and points excitedly to the two drawings.

** The occurrence of this word in this context followed many prior occasions on which I had drawn cats of several sizes and said: 'here is a small one and this is even smaller'.

B. REGULAR EXTENSION: The flexible use of a word for a class of equivalent referents that all belong to the corresponding adult category for the same word, or the use of a word in one context only, where it is evident that the word is associated with a clearly defined concept.

(3) The following entries of the word oto 'car' were recorded during one week of study

12(16): In K's room, K is lying in her bed while M is dressing her. Suddenly K says oto '(a) car'. M hears the noise of a car engine outside.

12(16): Outside in front of our house, K and M stand and watch a group of children playing. When a car comes into sight K says oto '(a) car'.

12(17): In K's room, M and K are playing. M hears the engine of a car starting outside. K says oto '(a) car'.

12(17): On the stairway, K is playing with one of her car toys (the red VW). D comes home, K shows him her toy and says oto '(a) car'.

12(17): Outside, K is playing with a car toy she has just received from one of her friends (called Gilad). She is moving the car back and forth and says oto '(a) car'.

12(18): In the living room, M and K watch television, K holds a car (her yellow pickup). Suddenly she shows it to me and says oto '(a) car'.

12(19): In parent's room, K is walking around swinging a large shopping bag. D asks ma yes lax sam?/ 'what do you have there?'/ K comes closer to D, shows the bag to D, looks inside it, and says oto '(a) car'. D and M are puzzled; we look into the bag and realize that K was right. There was a car-toy (the red VW) inside the bag.

(4) 13(0): On the porch: M says to K boi nisa labrexa/'let us go to the pool', K says ma/mai (mayim) 'water'. (K's grandmother reported to me the day before that when she was playing with K near the pool, K pointed to the water and said mai.

** The above context for using the word mayim is not very typical. It is interesting that K did not use the word in the context of taking a bath or requesting water to drink.

(5) 16(6): In K's room, M is standing on a chair. She is looking for something in the closet. M takes out several items and gives them to K who is playing on the floor. One of the items is a hot water bottle which has not been used since K was born. M gives the bottle to K, K shows it to D. When D takes the bottle K says babuk/(bak-buk) '(a) bottle'. She repeats the word in a high pitched voice and D returns it to her to play with. K tries to open the bottle she says uax/(liftoax) 'to open' and indicates to M that she wants the plug to be removed.

C. OVEREXTENSION: The overly-broad use of a word for a class of several referents, some of which fall outside the adult category for the same word. (A close examination of several contexts of use reveals what constituted the basis for extension).

(6) Throughout the period of study, several inappropriate applications of the word matate '(a) broom' were noted.

16(17): In the kitchen; M is washing dishes. K is playing with one of the doors of a closet. M hears K saying matate '(a) broom'. She thinks that K sees a broom inside the closet. However when M turns around to see what K is doing, she realizes that K is playing with a green funnel for watering plants.

16(19): In the kitchen, K is walking around holding a dustpan and swinging it back and forth. M asks maze?/'what is this?'/K says very confidently matate/'(a) broom'.

(7) The word peca '(a) sore' was extended by K to sores, cuts dark spots on cloths, knives, and scotch tapes.

17(28): In the study, K is walking around saying repeatedly in a whining tone pesa/x/x/(peca) '(a) wound'. M is speaking on the phone and does not respond. K is looking for something. She opens the drawer and seems disappointed. Finally she sees the scotchtape on one of the bookshelves. She streches her hand and says pesa/(peca) '(a) sore/cut/wound' and picks it up. Later on K is playing with the scotchtape on the floor she shows it to M and says again pesa/(peca) '(a) sore/cut/wound'.

** The irregular use of peca '(a) sore' persisted over a period of seven months and well into the multiword stage. Consider the following conversation from a tape-recording that was made when K was 19(17).

19(17): In the study, M is sitting by her desk and K is playing quietly on the floor. Suddenly she says:

K: Ima hine peca/
Mother here (a) sore
'Mommy, here is a sore'

M: ?eifo yes lax peca kereni?/
Where have you (a) sore kereni
'Where do you have a sore, kereni?'

(K hands a piece of scotchtake to M who realizes that she was playing all that time with a piece of scotchtape)

K: Kxi ima ze peca/
take Mother this (a) sore
'Take Mommy, this is a sore'

M: ze lo peca ze cellotape/
This not (a) sore this scotchtape
'This is not a sore. This is scotchtape'

K: roca peca ima, tni li peca/
want (a) sore Mother, give me (a) sore/
'I want sore, Mommy, give me a sore'

M: kxi cellotape kereni, ze niyardevek/
take (a) scotchtape K, this a sticky paper/
'Take the scotchtape, K, this is sticky paper'

(K takes the piece of cellotape from M, sticks it on her arm and shows it to M)

D. UNCLASSIFIED: Words that are used consistently and repeatedly by the child, but whose entries were ambiguous or not informative enough to ensure a clear decision on their extensional category. (These words could not be assigned to any of the three extension classes as defined above).

(8) Despite a relatively early emergence of the word niyar 'paper', and frequent uses of this word by the child, it was never clear to me whether niyar was K's word for pencils, paper, printed pages, the action of drawing, or the drawing itself.

14(5) In the kitchen, M is writing notes in K's diary; K observes M. Suddenly she starts to yell repeatedly niyar/x/x/ 'paper'. M gives K a piece of paper. K continues to whine. She says again and again niyar/x/x/ 'paper' and tries to catch M's hand. M gives K a pencil. K takes it happily. She sits down and draws on her piece of paper.

15(17) Outside, M and K are walking on the sidewalk. Suddenly K stops, she points to the painting of an arrow in the sidewalk, (a chalk drawing from a children's game on the sidewalk), and says niyar 'paper'. M is very surprised. She says ze ciyur 'it is a painting'. Later on when we pass another arrow M stops, points at it and asks K' ma ze? 'what (is) this?' K says confidently niyar 'paper'.

(9) Sometimes a decision could not be made as to whether a word was used referentially or was uttered by the child to indicate more complex relationships between the intended referent and the word. K's word dod '(an) uncle' was recorded several times in contexts that are very similar to the following:

14(10): In the kitchen, K is sitting on the floor eating fruit. M hears rhythmic sounds (coming from the kitchen of our neighbor). K stops eating, approaches M, and says dod 'an uncle', I respond bumbum mišehu dofek baxuc./ 'bumbum somebody is knocking outside' K says dod '(an) uncle'.

** It is very unclear from such usage whether the child was referring to the noise, or whether the word meant stranger and was uttered to express k's belief that somebody was instigating the perceived noise. (see Dromi, in press for more details on the unclassified category).

The next two Tables summarize the findings on: a) the relative distribution of the child's words in each of the four extension classes, b) the time of recording of each behavior relative to the history of the word, c) the length of time over which the different extensional behaviors persisted, and d) the changes overtime in the way a particular word was extended. All four categories of extension were

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Insert Tables 1 & 2 about here

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represented in my data. Most words were used regularly by the child from the very first week of recording. This finding shows that in many instances the child attaches a new word to a well defined concept. The relatively high prevalence of underextension during the first week of use is in accord with the suggestions made by Bowerman (1978b, 1980) and Schlesinger (1982) Clark's model seem not to be strongly supported by the findings of the present study. Finally, the identification of 58 different combinations of extension classes indicates that <u>different words in the child's early lexicon take different routes as their meaning develop</u>. It seems then, that no one model of the three outlined earlier is comprehensive enough to deal with the diversity of my findings. What seems to be needed is a multifaceted model, that can encompass the great many optional paths taken by the child to adult conventional meaning.

<u>Notes:</u>

1. The study reported here is based on the data that I collected for my Ph.D. research. I wish to thank my advisor Professor Melissa Bowerman for most interesting discussions of the issues considered here. Thanks are also reserved for Smadar Elata for transcribing my tapes, and to Dr. Ruth Berman for her editorial comments on an earlier draft.

2. Feminine pronouns are used throughout this paper for the sake of grammatical uniformity.

3. In the following examples Hebrew words are given in phonetic transcription and are all underlined. A Hebrew word enclosed in parentheses indicates the adult equivalent for a child's approximation. Age is given in months and days, thus 10(11) = ten months and eleven days. Other notations are: K=keren, M=mother, /=end of an utterance, x=exact repetition of a preceding utterance, **=comments on diary entries made by mother.

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Figure 1: Keren's cumulative lexicon throughout the one word stage

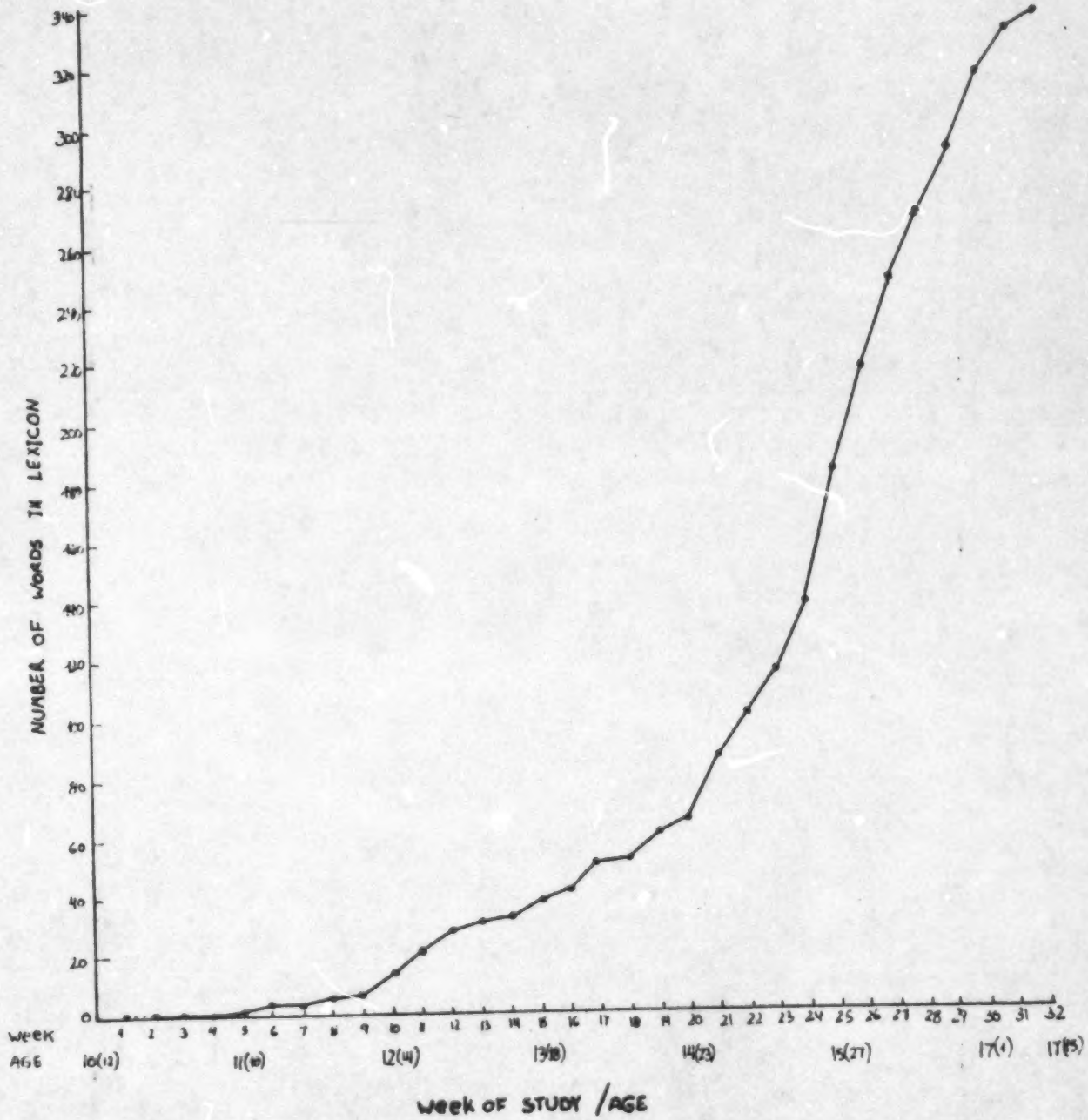

Table 1: Summary of Extension Types

Extension		Underextension			Regular extension			Overextension			Unclassified		
Number of words		85			212			77			82		
Time of recording		First week	Late occurrence	Last week	First week	Late occurrence	Last week	First week	Late occurrence	Last week	First week	Late occurrence	Last week
		77	11	15	125	87	197	22	55	24	52	30	36
Statistics: Length of period	Mean	2.00						5.00			6.00		
	S.D.	2.00						6.00			7.00		
	Mode	1.00						1.00			1.00		
	Range	1.00 - 10.00						1.00 - 21.00			1.00 - 24.00		

* Only those factors which are mutually exclusive are additive.

Table 2: The Distribution of Extension Patterns

1	▯...	2	▯▯▯▯▯▯▯::::	3	.....	4	▯.....
12	▯▯▯.....	23	.	32	.....	42	▯
13	...	28	.	34	.	43	.
14	...	212	...	323	.	48	.
123	.	232	.....	343	.	412	...
124	.	242	....	3232	.	414	.
128	.	243	..	3242	.	424	..
131	.	2324	.	3434	.	432	..
132	...	2432	.	32423232	.	434	.....
141	.	23232	....			438	.
142	.....	23432	.			4232	.
1232	..	24232	.			4313	.
1312	.	242343	.			41234	.
1313	.					42342	.
1342	.					43232	.
1423	.					43432	.
1434	.					434343	.
13232	..						
142323	.						

1 = Underextension; 2 = Regular extension; 3 = Overextension; 4 = Unclassified
.=one word; ▯=ten words